



Secretariat

Distr.
GENERAL

ST/SG/AC.10/C.3/28/Add.1
15 January 1998

ENGLISH
Original: ENGLISH AND FRENCH

COMMITTEE OF EXPERTS ON THE TRANSPORT
OF DANGEROUS GOODS

Sub-Committee of Experts on the
Transport of Dangerous Goods

REPORT OF THE SUB-COMMITTEE OF EXPERTS
ON ITS FOURTEENTH SESSION
(Geneva, 8-18 December 1997)

Addendum I

Annex 2

Draft amendments to the Model Regulations annexed to the tenth revised edition
of the United Nations Recommendations on the Transport
of Dangerous Goods (ST/SG/AC.10/1/Rev.10) and to the
Manual of Tests and Criteria (ST/SG/AC.10/11/Rev.2)

**1. DRAFT AMENDMENTS TO THE MODEL REGULATIONS ANNEXED TO
THE TENTH REVISED EDITION OF THE UNITED NATIONS
RECOMMENDATIONS ON THE TRANSPORT OF DANGEROUS GOODS
(Refer to ST/SG/AC.10/1/Rev.10)**

Chapter 2.0

2.0.3 Add a new item (c) to read as follows:

"(c) liquid desensitized explosives of Class 3;"

Renumber consequently other sub-paragraphs.

2.0.3.1 In table, add "*" after 3 I, 3 II and 3 III and delete "*" after 5.1 I, 5.1 II and 5.1 III in first column.

Amend footnote */ to read as follows:

"/ Substances of Division 4.1 other than self-reactive substances and solid desensitized explosives and substances of Class 3 other than liquid desensitized explosives."

Chapter 2.1

2.1.3.5.3 Amend to read as follows:

"2.1.3.5.3 Where a substance is assigned to Class 1 but is diluted to be excluded from Class 1 by Test Series 6, this diluted substance (hereafter referred to as desensitized explosive) should be listed in the Dangerous Goods List of Chapter 3.2 with an indication of the highest concentration which excluded it from Class 1 (see 2.3.1.4 and 2.4.2.4) and if applicable, the concentration below which it is no longer deemed subject to these Regulations. New solid desensitized explosives subject to these Regulations should be listed in Division 4.1 and new liquid desensitized explosives should be listed in Class 3. When the desensitized explosive meets the criteria or definition for another class or division, the corresponding subsidiary risk(s) should be assigned to it."

Chapter 2.3

2.3.1.1 Add a new paragraph 2.3.1.1 to read as follows:

"2.3.1.1 Class 3 includes the following substances:

- (a) flammable liquids (see 2.3.1.2 and 2.3.1.3);
- (b) liquid desensitized explosives (see 2.3.1.4).

Renumber existing paragraph 2.3.1.1 and 2.3.1.2 as 2.3.1.2 and 2.3.1.3.

Add a new paragraph 2.3.1.4 to read to read as follows:

"2.3.1.4 Liquid desensitized explosives are explosive substances which are dissolved or suspended in water or other liquid substances, to form an homogeneous liquid mixture to suppress their explosives properties (see 2.1.3.5.3).
Entries in the Dangerous Goods List for liquid desensitized explosives are : UN 1204, UN 2059, UN 3064 and UN 3343."

Chapter 2.4

2.4.2 In the heading, insert "solid" before "desensitized".

2.4.2.4 Amend to read as follows:

"2.4.2.4 Division 4.1 Solid desensitized explosives

Solid desensitized explosives are explosive substances which are wetted with water or alcohols or are diluted with other substances, to form a homogeneous solid mixture to suppress their explosive properties (see 2.1.3.5.3).

Entries in the Dangerous Goods List for solid desensitized explosives are
UN Nos 1310, UN 1320, UN 1321, UN 1322, UN 1336, UN 1337, UN 1344,
UN 1347, UN 1348, UN 1349, UN 1354, UN 1356, UN 1357, UN 1371, UN 1371,
UN 2555, UN 2556, UN 2852, UN 2907, UN 3270, UN 3319 and UN 3344.

Chapter 3.2

1. Insert the following amendments:

UN 1210 Amend the name in column (2) to read:

"PRINTING INK, flammable or PRINTING INK RELATED MATERIAL
(including printing ink thinning or reducing compound), flammable"

UN 1829: Replace "TP2" with "TP4" and insert "TP25, TP26" in column (11).

UN 2054 Replace "3" with "8" in column (3) and insert "3" in column (4).
Replace "III" with "I" in column (5) and replace "5L" with "NONE" in column (7).
Replace "T2" with "T8" in column (10) and replace "TP1" with "TP2, TP9" in
column (11).

UN 2250: Insert "T3" in column (10) and "TP3" in column (11).

UN 2447: Insert "TP26" in column (11).

UN 3057: Insert "TP21" in column (11).

UN 3176: Insert "TP26" in column (11)

UN 3270 Add special provision "[286]" in column (6) and amend the name in column (2) to read as follows:

"NITROCELLULOSE MEMBRANE FILTERS, with not more than 12.6% nitrogen, by dry mass"

2. Insert Portable tank instruction "T50" in column 10 of the Dangerous Goods List for the following entries:

UN 1060, UN 1073, UN 2035, UN 3057, UN 3070, UN 3161 and UN 3163 :

Chapter 3.3

Section 3.3.1

Special provisions

237 Amend to read as follows:

"237 The membrane filters, including paper separators, coating or backing materials, etc., that are present in transport, shall not be liable to propagate a detonation as tested by one of the tests described in the Manual of Tests and Criteria, Part I, [Test series 1(a)].

In addition, the competent authority may determine, on the basis of the results of suitable burning rate tests taking account of the standard tests in the Manual of Tests and Criteria, Part III, sub-section 33.2.1, that nitrocellulose membrane filters in the form in which they are to be transported are not subject to the provisions of these Regulations applicable to flammable solids in Division 4.1."

269 Delete.

Add a new special provision 286 to read as follows:

"[286 Nitrocellulose membrane filters covered by this entry, each with a mass not exceeding 0.5g, are not subject to these Regulations when contained individually in an article or a sealed packet.]"

Chapter 4.1

4.1.1.1 Amend paragraph 4.1.1.1 to read as follows:

"4.1.1.1 Dangerous goods shall be packed in packagings (new, reconditioned or reused) of good quality. Packagings shall be strong enough to withstand the shocks and loadings normally encountered during transport, including trans-shipment between transport units and/or warehouses as well as any removal from a pallet or overpack for subsequent manual or mechanical handling. Packagings shall be

constructed and closed so as to prevent any leakage from the package as prepared for transport which might be caused under normal conditions of transport, by vibration, or by changes in temperature, humidity or pressure (resulting from altitude, for example). No harmful quantity of dangerous residue shall adhere to the outside of packages."

4.1.3.5 Add, at the end, the following sentences:

"Packagings meeting the test criteria of Packing Group I may be used. To avoid unnecessary confinement metal packagings of Packing Group I shall not be used."

Chapter 4.2

4.2.1.9.6 (a) Add "or maximum temperature of the substance during transport in the case of a heated substance" after "at 20°C,".

4.2.1.9.7 Add a new paragraph 4.2.1.9.7 to read as follows:

"4.2.1.9.7 Forklift pockets of portable tanks shall be closed off when the tank is filled. This provision does not apply to portable tanks which according to 6.6.3.13.4 need not be provided with a means of closing off the forklift pockets."

4.2.1.11.1 Delete existing text and insert "[reserved]".

4.2.2.9 Add a new paragraph 4.2.2.9 to read as follows:

"4.2.2.9 Forklift pockets of portable tanks shall be closed off when the tank is filled. This provision does not apply to portable tanks which according to 6.6.4.12.4 need not be provided with a means of closing off the forklift pockets."

4.2.3.9 Add a new paragraph 4.2.3.9 to read as follows:

"4.2.3.9 Forklift pockets of portable tanks shall be closed off when the tank is filled. This provision does not apply to portable tanks which according to 6.6.4.12.4, as appropriate, need not be provided with a means of closing off the forklift pockets."

4.2.4.2.6 In the table for T50, add the following entries:

UN No.	Non-refrigerated liquefied gases	Max. allowable working pressure (bar) Small; Bare; Sunshield; Insulated	Openings below liquid level	Pressure relief requirements	Maximum filling ratio (kg/l)
1060	Methylacetylene and propadiene mixture, stabilized	28.0 24.5 22.0 20.0	Allowed	Normal	0.43
1078	Refrigerant gas, n.o.s.	See MAWP definition in 6.6.3.1	Allowed	Normal	4.2.2.7
2035	1,1,1-Trifluoroethane (Refrigerant gas R 143a)	31.0 27.5 24.2 21.8	Allowed	Normal	0.76
3057	Trifluoroacetyl chloride	14.6 12.0 11.3 9.9	Not allowed	6.6.3.7.3	1.17
3070	Ethylene oxide and dichlorodifluoromethane mixture with not more than 12.5% ethylene oxide	14.0 12.0 11.0 9.0	Allowed	6.6.3.7.3	1.09
3161	Liquefied gas, flammable, n.o.s.	See MAWP definition in 6.6.3.1	Allowed	Normal	See 4.2.2.7
3163	Liquefied gas, n.o.s.	See MAWP definition in 6.6.3.1	Allowed	Normal	See 4.2.2.7

4.2.4.3 Add a new portable tank special provision TP25 to read as follows:

- "TP25 - Sulphur trioxide 99.95% pure and above may be transported in tanks without an inhibitor provided that it is maintained at a temperature equal to or above 32.5°C."

Add a new portable tank special provision TP26 to read as follows:

- "TP26 - When transported under heated conditions, the heating device shall be fitted outside the shell. For UN 3176 this requirement only applies when the substance reacts dangerously with water."

Chapter 6.3

6.3.2.6(b) Read the last sentence as follows:

"Following each impact, there shall be no leakage from the primary receptacle(s)."

Chapter 6.6

6.6.2.20.3 Add a new paragraph 6.6.2.20.3 to read as follows:

"6.6.2.20.3 If a portable tank is designed and approved for handling in open seas, the words "OFFSHORE PORTABLE TANK" shall be marked on the identification plate."

6.6.3.16.3 Add a new paragraph 6.6.3.16.3 to read as follows:

"6.6.3.16.3 If a portable tank is designed and approved for handling in open seas, the words "OFFSHORE PORTABLE TANK" shall be marked on the identification plate."

6.6.4.15.3 Add a new paragraph 6.6.4.15.3 to read as follows:

"6.6.4.15.3 If a portable tank is designed and approved for handling in open seas, the words "OFFSHORE PORTABLE TANK" shall be marked on the identification plate."

New Chapter 6.6 (Large packagings - See ST/SG/AC.10/C.3/26/Add.2)

6.6.4.2.8 Delete.

Chapter 7.1

7.1.1 Add the following two new paragraphs:

"7.1.1.3 Dangerous goods shall be secured by suitable means in the transport unit in a manner that will prevent any movement during the journey which would change the orientation of the package or cause it to be damaged."

"7.1.1.4 During loading and unloading dangerous goods shall be protected from being damaged. Particular attention shall be paid to the handling of packages during their preparation for transport to the type of transport unit on which they are to be carried and to the method of loading or unloading, so that accidental damage is not caused through dragging or mishandling of the packages."

Index

For the entry of MORPHOLINE, replace "3" with "8" in column (Class).

**2. DRAFT AMENDMENTS TO THE MANUAL OF TESTS AND CRITERIA
(Refer to ST/SG/AC.10/11/Rev.2)**

GENERAL TABLE OF CONTENTS

APPENDICES Insert a new entry to read:

"Appendix 6 SCREENING PROCEDURES"

GENERAL INTRODUCTION

1.1.2 At the end, add the following new sentences:

"In some cases, a small scale screening procedure may be used to decide whether or not it is necessary to perform larger scale classification tests. Suitable examples of procedures are given in the introductions to some test series and in Appendix 6."

1.2.1 Amend the last sentence to read:

"... Test details, on an example method for emergency relief vent sizing of portable tanks for the transport of organic peroxides and on screening procedures."

INTRODUCTION TO PART II

20.3.3.3 Amend the last indent to read as follows:

"using rapid heating rates (when differential scanning calorimetry is used, the heating rates should normally be in the range 2 to 5 K/min.)"

At the end, add the following new sentence:

"If differential scanning calorimetry is used, the extrapolated onset temperature is defined as being the point of intersection of the tangent drawn at the point of greatest slope on the leading edge of the peak with the extrapolated baseline."

CONTENTS OF APPENDICES

Insert a new entry to read as follows:

"6 SCREENING PROCEDURES"

NEW APPENDIX 6

Insert a new Appendix 6 to read as follows:

"APPENDIX 6 SCREENING PROCEDURES

1. Purpose

1.1 Industry uses screening procedures to identify the hazard potential of raw materials, reactive mixtures and intermediates, products and by-products. The use of such procedures is essential to ensure safety during research and development and to ensure that new products and processes are as safe as possible. These procedures usually consist of a combination of a theoretical appraisal and small-scale tests and, in many cases, enable an adequate hazard evaluation to be carried out without the need for larger scale classification tests. This reduces the quantity of material required, lessens any detrimental effect on the environment and minimizes the amount of unnecessary testing.

1.2 The purpose of this appendix is to present example screening procedures. It should be used in conjunction with any screening procedures given in the introductions to the relevant test series. With the specified safety margin, the results from the screening procedures adequately predict when it is not necessary to perform the classification test as a negative result would be obtained. They are presented for guidance and their use is not compulsory. Other screening procedures may be used provided that adequate correlation has been obtained with the classification tests on a representative range of substances and there is a suitable safety margin.

2. Scope

2.1 A hazard evaluation for a new substance should be undertaken before it is offered for transport. Initially this evaluation can use the screening procedures given in this Appendix. If the screening procedure indicates that there is a hazard, the full classification procedure should be applied.

2.2 The screening procedures are only applicable to substances and stable, homogeneous mixtures of substances. If a mixture can separate out during transport, the screening procedure should also be performed on each reactive component of the mixture in addition to the mixture.

2.3 The remarks 1.1.2 from section 1 "general introduction" are emphasized that competence on the part of the testing authority is assumed and responsibility for classification is left with them.

3. Screening procedures for substances which may have explosive properties

3.1 The screening procedure may be used for new substances which are suspected of having explosive properties. When considering the explosive properties of self-reactive substances of Division 4.1 or organic peroxides of Division 5.2, refer to Part II of this manual and section 5.1 of this appendix. It should not be used for substances manufactured with the intention of producing a practical explosive or pyrotechnic effect.

3.2 Explosive properties are associated with the presence of certain chemical groups in a molecule which can react to produce very rapid increases in temperature or pressure. The screening procedure is aimed at identifying the presence of such reactive groups and the potential for rapid energy release. If the screening procedure identifies the material to be a potential explosive, the Class 1 Acceptance Procedure (see 10.3) should be applied.

NOTE: Neither a Series 1 type (a) propagation of detonation test nor a Series 2 type (a) test of sensitivity to detonative shock is required if the exothermic decomposition energy of organic materials is less than 800 J/g.

3.3 The acceptance procedure for Class 1 explosives need not be applied:

- (a) When there are no chemical groups associated with explosive properties present in the molecule. Examples of groups which may indicate explosive properties are given in Table A6.1

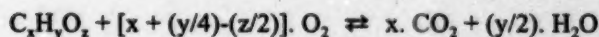
Table A6.1 EXAMPLES OF CHEMICAL GROUPS INDICATING EXPLOSIVE PROPERTIES IN ORGANIC MATERIALS

Structural feature	Examples
C-C unsaturation	Acetylenes, acetylides, 1,2-dienes
C-Metal, N-Metal	Grignard reagents, organo-lithium compounds
Contiguous nitrogen atoms	Azides, aliphatic azo compounds, diazonium salts, hydrazines, sulphonylhydrazides
Contiguous oxygen atoms	Peroxides, ozonides
N-O	Hydroxylamines, nitrates, nitro compounds, nitroso compounds, N-oxides, 1,2-oxazoles
N-halogen	Chloramines, fluoroamines
O-halogen	Chlorates, perchlorates, iodosyl compounds

or

- (b) When the substance contains chemical groups associated with explosive properties which include oxygen and the calculated oxygen balance is less than -200.

The oxygen balance is calculated for the chemical reaction:



using the formula:

$$\text{oxygen balance} = -1600 \cdot [2 \cdot x + (y/2) - z] / \text{molecular weight}$$

or

- (c) When the organic substance or a homogenous mixture of organic substances contain chemical groups associated with explosive properties but the exothermic decomposition energy is less than 500 J/g and the onset of exothermic decomposition is below 500 °C. (The temperature limit is to prevent the procedure being applied to a large number of organic materials which are not explosive but which will decompose slowly above 500 °C to release more than 500 J/g.) The exothermic decomposition energy may be determined using a suitable calorimetric technique (see 20.3.3.3).

or

- (d) For mixtures of inorganic oxidizing substances of Division 5.1 with organic material(s), the concentration of the inorganic oxidizing substance is:

less than 15 %, by mass, if assigned to Packing Group I (high hazard) or II (medium hazard);

less than 30 %, by mass, if assigned to Packing Group III (low hazard).

3.4 When the substance is a mixture containing any known explosives, the class 1 acceptance procedure should be applied.

4. Screening procedures for mixtures which may be flammable liquids (Class 3)

4.1 The procedure only applies to possible flammable mixtures containing known flammable liquids in defined concentrations although it may contain non-volatile components e.g. polymers, additives etc. The flash point of these mixtures need not be determined experimentally if the calculated flash point of the mixture, using the method given in 4.2, is at least 5 °C greater than the relevant classification criterion and provided that:

- (a) The composition of the mixture is accurately known (if the material has a specified range of composition the composition with the lowest calculated flash point should be selected for assessment);
- (b) The flash point (closed cup as given in 2.3.3 of the Model Regulations) of each component is known (an appropriate correlation has to be applied when these data are extrapolated to other temperatures than test conditions);
- (c) The activity coefficient is known for each component as present in the mixture including the temperature dependence;
- (d) The liquid phase is homogeneous.

4.2 A suitable method is described by Gruehling and Rasmussen (Ind. Eng. Chem. Fundament, 21, 186, (1982)). For a mixture containing non-volatile components, e.g. polymers or additives, the flash point is calculated from the volatile components. It is considered that a non-volatile component only slightly decreases the partial pressure of the solvents and the calculated flash point is only slightly below the measured value.

5. Screening procedures for substances which may be flammable solids (Class 4)**5.1 Substances which may be self-reactive substances (Division 4.1)**

The classification procedures (see section 20.4) for self-reactive substances need not be applied if:

- (a) There are no chemical groups present in the molecule associated with explosive or self-heating properties; examples of such groups are given in Tables A6.1 and A6.2.

Table A6.2 EXAMPLES OF CHEMICAL GROUPS INDICATING SELF-REACTIVE PROPERTIES IN ORGANIC MATERIALS

Structural feature	Examples
Mutually reactive groups	Aminonitriles, haloanilines, organic salts of oxidizing acids
S=O	Sulphonyl halides, sulphonyl cyanides, sulphonyl hydrazides
P-O	Phosphites
Strained rings	Epoxides, aziridines
Unsaturation	Olefins, cyanates

or

- (b) For a single organic substance or a homogeneous mixture of organic substances, the estimated SADT is greater than 75 °C or the exothermic decomposition energy is less than 300 J/g. The onset temperature and decomposition energy may be estimated using a suitable calorimetric technique (see 20.3.3.3).

5.2 Substances which may be liable to spontaneous combustion (Division 4.2)

5.2.1 The classification procedure for *pyrophoric solids and liquids* need not be applied when experience, in production or handling, shows that the substance do not ignite spontaneously on coming into contact with air at normal temperatures (i.e. the substance is known to be stable at room temperature for prolonged periods of time (days)).

5.2.2 The classification procedure for *self-heating substances* need not be applied if the results of a screening test can be adequately correlated with the classification test and an appropriate safety margin is applied. Examples of screening tests are:

- (a) The Greuer Oven test (VDI guideline 2263, part 1, 1990, *Test methods for the Determination of the Safety Characteristics of Dusts*) with an onset temperature 80 K above the reference temperature for a volume of 1 l (33.3.1.6).

- (b) The Bulk Powder Screening Test (Gibson, N. Harper, D. J. Rogers, R. *Evaluation of the fire and explosion risks in drying powders*, Plant Operations Progress, 4 (3), 181 - 189, 1985) with an onset temperature 60 K above the reference temperature for a volume of 1.1 (33.3.1.6).

5.3 *Substances which in contact with water may react to emit flammable gases (Division 4.3)*

The classification procedure for substances which may react with water to emit flammable gases need not be applied if:

- (a) The chemical structure of the substance does not contain metals or metalloids; or
- (b) Experience in production or handling shows that the substance does not react with water, e.g. the substance is manufactured in water or washed with water; or
- (c) The substance is known to be soluble in water to form a stable mixture.

6. Screening procedures for substances which may be oxidizing substances and those which may be organic peroxides (Class 5)

6.1 *Substances which may be oxidizing substances (Division 5.1)*

6.1.1 For *organic compounds*, the classification procedure for oxidizing substances of Division 5.1 need not be applied if:

- (a) The compound does not contain oxygen, fluorine or chlorine; or
- (b) The compound contains oxygen, fluorine or chlorine and these elements are chemically bonded only to carbon or hydrogen.

6.1.2 For *inorganic substances*, the test procedure in Section 34 need not be applied if the substance does not contain any oxygen or halogen atoms.

6.2 *Substances which may be organic peroxides (division 5.2)*

6.2.1 Organic peroxides are classified by definition based on their chemical structure and on the available oxygen and hydrogen peroxide content of formulations (see 20.2.2)."
